

Appl. No. : 10/766,973  
Filed : January 29, 2004

### REMARKS

Reconsideration and allowance of this application is respectfully requested. Claims 1-28 are pending in this application. Claims 1-8, 12-18 and 20-28 are rejected. Claims 9-11 and 19 are objected to.

In view of the argument below, Applicant submits that this application is in condition for allowance and such action is earnestly requested. The Office Action's reasons for rejection are addressed below.

#### Allowable subject matter

The Office Action objects to Claims 9-11 and 19 as being dependent on rejected Claims 1 and 12. The Office Action indicates that Claims 9-11 and 19 would be allowable if rewritten in independent form.

In view of the asserted allowability of independent Claims 1, 12 and 21, as discussed below, Applicant declines to rewrite Claims 9-11 and 19 at this time.

#### Rejection of the Claims

The following references were cited in the Office Action: U.S. Patent No. 6,263,830 to Kamarehi *et al.* ("Kamarehi") and "Microwave Devices and Circuits" by S.Y. Liao ("Liao").

Claims 1-8, 12-18 and 20-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamarehi in view of Liao. Claim 1 recites, *inter alia*, a microwave energy waveguide communicating with a power source, and a coupler coupling microwave energy from the waveguide to a helical coil surrounding a plasma chamber, the plasma chamber configured to be mounted in fluid communication between a source of gases and a processing chamber. Claim 12 recites, *inter alia*, propagating a traveling microwave signal along a microwave conducting structure having a section with a helical shape surrounding a plasma tube and flowing a gas through the plasma tube such that a plasma is ignited in the gas. Claim 21 recites, *inter alia*, propagating microwave energy in a traveling wave along a microwave conducting structure having a shape of a slow wave structure and surrounding a plasma reactor tube, igniting a plasma within the plasma reactor tube and flowing plasma products into a process chamber.

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Kamarehi teaches a chemical downstream etch (CDE) reactor 10 consisting of a tube 34 and a plasma generator 12, which further consists of a waveguide 26. *See* Kamarehi, Figure 1. Microwave power is conducted from the waveguide 26 to a gas flowing through the tube 34, forming a plasma. The Office Action admits that Kamarehi does not show the use of a traveling wave tube (“TWT”) helix. Office Action at page 2. Liao teaches a helix TWT to transfer energy from an electron beam to a signal wave on the helix to amplify the signal wave. *See* Liao, Figure 6-4-2 and the related text. The electron beam is directed longitudinally through the helix, and the electrons are collected at a collector at an opposite end of the helix. The Office Action asserts that it would have been obvious to modify the Kamarehi system to feed into a TWT helix, in view of Liao, in order to “enable more effective power conversion.” Office Action at page 2.

Applicant respectfully disagrees with the Office Action because the prior art does not provide a suggestion or motivation for combining Kamarehi and Liao in the manner claimed. The asserted combination does not include all of the limitations of the claimed inventions, such as a helical coil surrounding a plasma chamber (Claim 1), a microwave conducting structure that has a helically shaped section surrounding a plasma tube (Claim 12), or a microwave conducting structure having a shape of a slow wave structure and surrounding a plasma reactor tube (Claim 21).

Without acquiescing with respect to the Office Action’s assertion that there was an adequate suggestion to combine Kamarehi and Liao, the asserted combination does not meet the claim language. The asserted combination at most involves a helix or coil connected between a power source and a point of energy transfer to a gas flow conduit, with an electron beam directed through the coil to amplify a signal wave conducted within the coil. There is no teaching or suggestion in either Kamarehi or Liao (nor the prior art of record) to surround the tube 34 of Kamarehi with the helical coil of Liao. In modifying Kamarehi in view of Liao, the skilled artisan would have at most replaced Kamarehi’s waveguide 26 with the coil of Liao, and then directed an electron beam through the coil to amplify a signal wave conducted within the coil. The Office Action has not pointed to any prior art teachings that suggest providing a coil or helix around a gas-containing element, such as a tube or chamber.

Accordingly, Applicant respectfully requests that the rejection of independent Claims 1, 12 and 21 be withdrawn.

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Claims 2-8, 13-18, 20 and 22-28 recite additional features of advantage and utility. Moreover, these claims are allowable because they depend from and therefore include all of the limitations of Claims 1, 12 and 21, respectively. The combination of Kamarehi and Liao does not teach all of the limitations of Claims 1, 12 and 21, let alone the unique combinations of limitations of Claims 2-8, 13-18, 20 and 22-28. Accordingly, Applicant respectfully requests that the rejections of Claims 2-8, 13-18, 20 and 22-28 also be withdrawn.

### CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance and requests the same. If there is any further hindrance to allowance of the pending claims, the Examiner is invited to contact the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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AMEND

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